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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/075,392	05/08/1998	JOHN G. ATWOOD	BT-4522	3603

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EXAMINER	
BACKER, FIRMIN	
ART UNIT	**PAPER NUMBER**
3621	

DATE MAILED: 04/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/075,392	ATWOOD ET AL.
	Examiner	**Art Unit**
	Firmin Backer	3621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 07 October 2002 .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,3-33 and 41-44 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,3-33 and 41-44 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

15)☐ Notice of References Cited (PTO-892)

16)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

17)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .

18)☐ Interview Summary (PTO-413) Paper No(s). _____ .

19)☐ Notice of Informal Patent Application (PTO-152)

20)☐ Other: .

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 7th, 2002 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 1, 3-33, 41-44 have been considered but are moot in view of the new ground(s) of rejection. Applicant has also requested suspension of prosecution pending a response to the last office action. The suspension was granted on January 7th, 2002. However, thus far, a response has not been filed by the applicant. Therefore, the suspension has been removed and a new action is being issued

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 3-8, 14-29, 31-33, 41-44 are rejected under 35 U.S.C. 102(b) as being anticipated by Atwood et al (U.S. Patent No. 5,475,610).

5. As per claim 1, 22, 24, Atwood et al teach an apparatus for performing the polymerase chain reaction (a computer system directed instruments for performing polymerase chain reaction) in a plurality of liquid reaction mixtures (many samples, fig.1 no. 11) (see abstract column 1 lines 13-20); the apparatus including a plurality of vials (sample tubes, fig. 8 no. 66) containing such liquid reaction mixtures, the vials having an upper portion and a lower portion (see fig 13, no. 266, 268); the apparatus comprising: an assembly (assembly, fig 1) for cycling the vials through a series of temperature excursions including a sample block for receiving the vials (see column 3 lines 35-46, 9 lines 30-52, 15 lines 46-60), a heat sink (heat sink), a clamping mechanism positioned thermoelectric devices between the sample block and the heat sink, a heater comprises and electrical resistive path, positioned around the perimeter of the sample block (see fig 2, 9, 14, 14.1, 15, 19, column 6 lines 44-54, 10 lines 2-31, 15 lines 46-60, 16 lines 2-14, 35-50, 17 lines 1-25)), a cover (cover, fig 1 no, 14) for applying a seating force (seating force) directly to the vials and for applying a constant temperature to the upper portion of the vials (see column 14 lines 7-43); and a computing (central processing system, fig 1 no. 20, 24) including a memory device apparatus for controlling the temperature excursions of the assembly and the constant temperature of the cover (see column 9 lines 46-52, 12 lines 6-27), a pin (bolts) having a first end and a second end, the first end in close contact with the sample block and the

second end in close contact with the heat sink so as to provide a thermal path between the sample block and the heat sink (fig 9, see column 9 lines 46-52, 12 lines 6-27, 16 lines 35-51).

6. As per claim 3-8, Atwood et al teach an apparatus wherein the sample rectangular silver block (block), comprising sample electroformed single piece wells (wells) arranged in a 8x12 array having top and bottom and an upper connecting support plate (plate) (see fig 2, 9, column 15 lines 46-60, 16 lines 2-14, 35-50, 17 lines 1-25).

7. As per claim 14, Atwood et al teach an apparatus wherein the heat sink comprises: a plate (steel place) having a top side and a bottom side (see fig 2, 9, column 15 lines 46-60, 16 lines 2-14, 35-50, 17 lines 1-25); a plurality of fins (fin) extending perpendicularly from the bottom side; a trench extending around the perimeter of the top side to impede heat loss from the perimeter; a fail placed in close proximity to the fills to control air flow through the fills (see column 10 lines 2-31, 11 line 60-12 line 5); and a recess within the plate for receiving a temperature sensor (see fig 2, 9, column 15 lines 46-60, 16 lines 2-14, 35-50, 17 lines 1-25).

8. As per claim 15-21, Atwood et al teach an apparatus wherein the clamping mechanism comprises (bolt): a rectangular shape spine (support) and the spine having a plurality of openings in the spine for receiving fasteners; a plurality of rectangular fingers (bracket) having top and bottom extending laterally from the spine and have a first end protruding laterally from the spine

and a protrusion extending downward from the first end and a beveled front edge (see column 16 lines 2-14 35-17 line 25).

9. As per claim 23 Atwood et al teach an apparatus wherein the electrically resistive path (resistance) comprises a first set of sections located on opposite sides of the frame shaped carrier having a first power density (received node having power of +15 volt) and a second set of sections located on opposite sides of the frame shaped having a second power density (received node having power of -15 volt) (see column 47 line 48-48 line 4).

10. As per claim 26 Atwood et al teach apparatus wherein the assembly comprises of at least one devise (thermal cyclic system) for changing (changing) the temperature of the apparatus further comprising a system for measuring (measuring) the AC resistance (resistance) of the thermoelectric device (see column 12 lines 6-27, 23 lines 45-54).

11. As per claim 27, Atwood et al teach apparatus wherein a device has a first and second heating and cooling surface comprising (heating and cooling apparatus): a first temperature and second sensor positioned to be in thermal communication with the first heating and cooling surface (*The CPU 20 controls the temperature of the sample block 12 by sensing the temperature of the metal of the sample block via temperature sensor 21 and bus 52 in FIG. 1 and by sensing the temperature of the circulating coolant liquid via bus 54 and a temperature sensor in the*

coolant control system) (see fig 1, column 9 line 46-52, 12 lines 6-27, 25 lines 44-65); a bipolar amplifier circuit (power supply) for providing power to the thermoelectric device, a circuit (analog circuit) for sensing AC voltage/current across the thermoelectric device and producing a DC voltage/current representing the AC voltage/current (fig 1, column 8 lines 11-27, 46 lines 25-37); a microcontroller (control system represented by CPU block 10) programmed to receive the signals from the first and second temperature sensors and voltage produced by the sensors (read various temperature sensor), to cause the bi-polar amplifier to provide power to thermoelectric device, and AC voltage to be superimposed on the bi-polar amplifier power (see fig 1 and column 47 lines 3-25, 47 line 47-49 line 59), to calculate the AC resistance of the thermoelectric device from the voltages; to compensate for ambient temperature error by performing a polynomial calculation (to calculate temperature) (see column 47, lines 3-10); and to store the compensated AC resistance measurement (see fig 1 and column 47 lines 3-25, 47 line 47-49 line 59),

12. As per claim 28, 29, Atwood et al teach a method for measuring the AC resistance of a thermoelectric device having a first heating and cooling, surface and a second heating and cooling surface, the method comprising: measuring (measuring) the temperature of the first and the second heating and cooling surface (see column 20 lines 6-18, 48 lines 5-21); applying (applying power) an AC power to the thermoelectric device to cause the first heating and cooling surface and the second heating and cooling surface to attain the same temperature (see fig 10, column 12 lines 6-21, 17 line 66-18 line 30; measuring the AC voltage/ and current across the

thermoelectric device; calculating the AC resistance of the thermoelectric device from the measured AC voltage and the measured AC current (see fig 1 and column 47 lines 3-25, 47 line 47-49 line 59). Atwood et al further teach a method for performing a calculation for compensating for ambient temperature error to calculate a compensation AC resistance measurement (see column 47, lines 3-10); and storing the compensated AC resistance measurement (see fig 1, column 9 line 46-52, 12 lines 6-27, 25 lines 44-65).

13. As per claim 31, Atwood et al teach a method for determining the temperature of a mixture in a sample vial, the vial having an upper portion and a lower portion ail contained in an apparatus (see abstract column 1 lines 13-20) comprising an assembly (assembly) for cycling the vials through a series of temperature excursions (fig. 14, 14.1, 15, 19, column 6 lines 44-54, 10 lines 2-31); a cover (cover) for applying a seating force (seating force) directly to the vials and for applying a constant temperature to the upper portion of the vials (see column 14 lines 7-43); and a computing (central processing system) apparatus for controlling the temperature excursions of the assembly and the constant temperature of the cover (see column 9 lines 46-52, 12 lines 6-27). The method further comprising measuring the temperature of the sample block and applied by the cover (see column 20 lines 6-18, 48 lines 5-21), determining the thermal resistance and capacitance (thermal capacity) of the vial between the sample block and the mixture (see column 57 lines 12-33), the thermal resistance and capacitance of air in parallel with the vial between the mixture and the cover (see column 20 lines 6-18, 48 lines 5-21); and

calculating the temperature of the mixture as a function of the temperature of the above parameters (see column 28 lines 24-38).

14. As per claim 32, Atwood et al teach a method of calibrating an assembly for cycling samples through a series of temperature excursions comprising of an associated memory device (memory) capable of storing data related to the assembly (see column 9 lines 46-52, 12 lines 6-27), a sample block for receiving the vials (see column 3 lines 35-46, 9 lines 30-52, 15 lines 46-60); a heat sink (heat sink); a clamping mechanism positioned so as to clamp the Peltier thermoelectric devices between the sample block and the heat sink to provide a temperature of .02 C; a heater comprises of electrically resistive path embedded in a frame shaped film carrier positioned loosely around the perimeter of the sample block (see fig 2, 9, column 15 lines 46-60, 16 lines 2-14, 35-50, 17 lines 1-25); the method comprising: applying power to the thermoelectric devices, causing the assembly to cycle through a desired series of temperature excursions measuring the actual temperature excursions, comparing the actual temperature excursions with the desired temperature excursions (see column 52 lines 49-53 line 4, 7 line 57-80 line 3, 12-19), adjusting the power applied to the thermoelectric devices so that the actual temperature excursions match the desired temperature excursions recording the adjusted power in the memory device for further utilization in obtaining the desired series of temperature excursions (see fig 47a, 47b, column 48 lines 5-21, 49 line 16-59).

15. As per claims 33, 43, 44, Atwood et al teach an assembly (assembly, fig 1) for cycling the vials through a series of temperature excursions including a sample block for receiving the vials (see column 3 lines 35-46, 9 lines 30-52, 15 lines 46-60), thermoelectric devices, a heat sink (heat sink), a clamping mechanism positioned thermoelectric devices between the sample block and the heat sink, a heater positioned around the perimeter of the sample block (see fig 2, 9, 14, 14.1, 15, 19, column 6 lines 44-54, 10 lines 2-31, 15 lines 46-60, 16 lines 2-14, 35-50, 17 lines 1-25)), a pin (bolts) positioned at the center to reduce thermal gradients across the block, having a first end and a second end, the first end in close contact with the sample block and the second end in close contact with the heat sink so as to provide a thermal path between the sample block and the heat sink (fig 9, see column 9 lines 46-52, 12 lines 6-27, 16 lines 35-51) means for connecting the assembly to a power source and a computing apparatus (central processing system, fig 1 no. 20, 24) for controlling the temperature excursions of the assembly and the constant temperature of the cover (see column 9 lines 46-52, 12 lines 6-27).

16. As per claim 40, Atwood et al teach apparatus wherein a device has a first and second heating and cooling surface comprising (heating and cooling apparatus): a first temperature and second sensor positioned to be in thermal communication with the first heating and cooling surface (*The CPU 20 controls the temperature of the sample block 12 by sensing the temperature of the metal of the sample block via temperature sensor 21 and bus 52 in FIG. 1 and by sensing the temperature of the circulating coolant liquid via bus 54 and a temperature sensor in the coolant control system*) (see fig1, column 9 line 46-52, 12 lines 6-27, 25 lines 44-65); a bipolar

amplifier circuit (power supply) for providing power to the thermoelectric device; a circuit (analog circuit) for sensing AC voltage/current across the thermoelectric device and producing a DC voltage/current representing the AC voltage/current (fig 1, column 8 lines 11-27, 46 lines 25-37); a microcontroller (control system represented by CPU block 10) programmed to receive the signals from the first and second temperature sensors and voltage produced by the sensors (read various temperature sensor), to cause the bi-polar amplifier to provide power to the thermoelectric device, and AC voltage to be superimposed on the bi-polar amplifier power (see fig 1 and column 47 lines 3-25, 47 line 47-49 line 59), to calculate the AC resistance of the thermoelectric device from the voltages; to compensate for ambient temperature error by performing a polynomial calculation (to calculate temperature) (see column 47, lines 3-10); and to store the compensated AC resistance measurement (see fig 1 and column 47 lines 3-25, 47 line 47-49 line 59).

17. As per claim 41, Atwood et al teach apparatus wherein a device has a first and second heating and cooling surface comprising (heating and cooling apparatus) an assembly (assembly, fig 1) for cycling the vials through a series of temperature excursions including a sample block for receiving the vials (see column 3 lines 35-46, 9 lines 30-52, 15 lines 46-60), a cover (cover, fig 1 no, 14) for applying a seating force (seating force) directly to the vials and for applying a constant temperature to the upper portion of the vials (see column 14 lines 7-43); and a computing (central processing system, fig 1 no. 20, 24) including a memory device apparatus for controlling the temperature excursions of the assembly and the constant temperature of the cover

(see column 9 lines 46-52, 12 lines 6-27), a first temperature and second sensor positioned to be in thermal communication with the first heating and cooling surface (*The CPU 20 controls the temperature of the sample block 12 by sensing the temperature of the metal of the sample block via temperature sensor 21 and bus 52 in FIG. 1 and by sensing the temperature of the circulating coolant liquid via bus 54 and a temperature sensor in the coolant control system*) (see fig1, column 9 line 46-52, 12 lines 6-27, 25 lines 44-65); a bipolar amplifier circuit (power supply) for providing power to the thermoelectric device; a circuit (analog circuit) for sensing AC voltage/current across the thermoelectric device and producing a DC voltage/current representing the AC voltage/current (fig 1, column 8 lines 11-27, 46 lines 25-37); a microcontroller (control system represented by CPU block 10) programmed to receive the signals from the first and second temperature sensors and voltage produced by the sensors (read various temperature sensor), to cause the bi-polar amplifier to provide power to the thermoelectric device, and AC voltage to be superimposed on the bi-polar amplifier power (see fig 1 and column 47 lines 3-25, 47 line 47-49 line 59), to calculate the AC resistance of the thermoelectric device from the voltages; to compensate for ambient temperature error by performing a polynomial calculation (to calculate temperature) (see column 47, lines 3-10); and to store the compensated AC resistance measurement (see fig 1 and column 47 lines 3-25, 47 line 47-49 line 59).

18. As per claim 42, Atwood et al teach apparatus wherein a device has a first and second heating and cooling surface comprising (heating and cooling apparatus) an assembly (assembly, fig 1) for cycling the vials through a series of temperature excursions including a sample block

for receiving the vials (see column 3 lines 35-46, 9 lines 30-52, 15 lines 46-60), a cover (cover, fig 1 no, 14) for applying a seating force (seating force) directly to the vials and for applying a constant temperature to the upper portion of the vials (see column 14 lines 7-43); and a computing (central processing system, fig 1 no. 20, 24) including a memory device apparatus for controlling the temperature excursions of the assembly and the constant temperature of the cover (see column 9 lines 46-52, 12 lines 6-27), As per claim 25, wherein the cover comprises a platen (platen), vertically and horizontally (vertical and horizontal tray, fig, 2) displaceable (displaceable) in relationship to the vials (minimum acceptable threshold force for seating the tubes) (see abstract, column 41 lines 21-65, 42 lines 31-43, claim 143, 154-156), the platen including: an array (array of holes) of openings corresponding to locations of the vials, the opening having a perimeter corresponding to a perimeter of the vials (large enough to accommodate 96 sample tubes, fig 2) (see abstract, fig 19, column 34, lines 20-35, claim 43, 164); a skirt (skirt) extending downward around the perimeter of the platen, the skirt having dimensions (similar in size) corresponding to the perimeter of a standard microtiter tray (standard microtiter tray, fig 45 no. 420, 486), the skirt constructed to engage the tray during vertical displacement of the platen, causing the openings (opening) and applying a seating force (seating force) on the vials for maintaining a snug fit (snug fit and flush fit) between walls of the sample vials and the assembly for receiving the sample vials (see fig 14 column 4 lines 52-62, 27, lines 23-54, 28 lines 39-57, claim 142) means for forcibly lowering the platen to maintain the seating force (means for forcibly lowering said platen to maintain said seating force on the cap for each tube) (see column 19 lines 20-46 and claim 142, 143); and heating means positioned in

close contact with the platen to maintain the platen at a constant temperature (maintain the sample block at a constant temperature) (see column 20 lines 19-35, 21 lines 7-46).

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

20. Claims 9-13, 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Atwood et al (U.S Patent No. 5,475,610) in view of Horn et al (U.S. Patent No. 5,834,828).

21. As per claims 9-12, 30, Horn et al teach an apparatus wherein the Peltier thermoelectric devices comprise: a first and second ceramic alumina layer having bonded copper traces having thickness of 0.508 mm; and a plurality of bismuth telluride pellets positioned between the first ceramic layer and the second ceramic layer and soldered using high temperature solder to the bonded copper traces on the first and second ceramic layers (see abstract, fig 2, column 1 lines 15-45, 2 line 61-4 line 53). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Atwood et al' system to include Horn et al's

system because this would have facilitated attainable larger temperature and produce higher FOMs.

22. As per claim 13, the combination of Atwood et al and Horn et al fails to teach an apparatus wherein the resistivity of the devices is determined from an equation: where R is the resistivity of the device, n is the number of pellets, r is the resistivity of the bismuth telluride being used, h is the height of the pellet and A is the cross sectional area of the bismuth telluride. However, official notice is taken the inventive concept of apparatus wherein the resistivity of the devices is determined from an equation: where R is the resistivity of the device, n is the number of pellets, r is the resistivity of the bismuth telluride being used, h is the height of the pellet and A is the cross sectional area of the bismuth telluride is known in the art, Therefore, it would have been obvious to one of ordinary skill in the art the time the invention was made to modify the combination of Atwood et al and Horn et al to include apparatus wherein the resistivity of the devices is determined from an equation: where R is the resistivity of the device, n is the number of pellets, r is the resistivity of the bismuth telluride being used, h is the height of the pellet and A is the cross sectional area of the bismuth telluride because this would have provide a means to calculate the resistivity of the apparatus thereby enhance the flexibility of the system.

23. As per claim 30, Atwood et al teach method for achieving linear temperature transitions Utilizing a thermoelectric device having at least a first heating and cooling surface and a second heating and cooling surface and being operated in a manner causing the first surface to be higher

in temperature and the second surface to be lower in temperature relative to each other (see abstract column 1 lines 13-20); the method comprising determining (measuring) a desired heat flow from the lower temperature Surface, electrical resistance of the thermoelectric device as a function of temperature, measuring the temperature of the lower and the higher temperature surface; calculating the average temperature of the lower and higher temperature surface (see column 20 lines 6-18, 48 lines 5-21), calculating the current required to achieve the desired heat flow as a function of the electrical resistance of the thermoelectric device as a function of temperature, the Seebeck coefficient of the thermoelectric device as a function of temperature, the conductance of the thermoelectric device as a function of temperature, the temperature of the lower temperature surface, the temperature of the higher temperature surface, and the average of the lower temperature surface and the higher temperature surface (see fig 49, column 84 lines 33-85 line 23). Atwood et al fail to teach a method for determining the Seebeck coefficient of the thermoelectric device as a function of temperature; determining the conduction of the thermoelectric device as a function of temperature. However, Horn et al teach a method for determining the Seebeck coefficient of the thermoelectric device as a function of temperature; determining the conduction of the thermoelectric device as a function of temperature (see abstract, column 1 lines 20-44). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Atwood et al' method to include; determining the Seebeck coefficient of the thermoelectric device as a function of temperature; determining the conduction of the thermoelectric device as a function of temperature because this would provide greater knowledge of the size of the heat flow capacity of the surface.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Firmin Backer whose telephone number is 703-305-0624. The examiner can normally be reached on Mon-Thu 8:30-6:00 and every other Fri 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sheikh Ayaz can be reached on 703-305-9648. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3719 for regular communications and 703-305-5352 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Firmin Backer
Examiner
Art Unit 3621

April 7, 2003